

## STATISTICS 613

Spring Semester, 2017, MW - 3-4:15pm, Blocker 448

**INSTRUCTOR:** Dr. Suhasini Subba Rao

**OFFICE:** BLOCKER 432

**OFFICE HOURS:** Monday and Wednesday 4:15-5pm or whenever I am in my office.

**email address:** suhasini@stat.tamu.edu

**Course helper:** This course does not have a TA. However, Satwik Acharyya will be advising me on how to make the material accessible and combing through the notes to remove mistakes. If want certain things changed, and do not want to approach me you can discuss it with him and he will bring the suggestions to me. **WWW:** [www.stat.tamu.edu/~suhasini/teaching.html](http://www.stat.tamu.edu/~suhasini/teaching.html). All the course materials can be obtained from my website. My notes cover many aspects in detail, which do not have to be learnt (or memorised) for your exams. We will use the course notes. The material is taken from various sources including Statistical Models, by A. C. Davison and Theoretical Statistics, by Cox and Hinkley.

**Prerequisites:** STAT 610, 611, 612 (or equivalent).

**AIMS:** This is a course is to prepare students who are about to embark on their PhD research. The aim of the course is to give an overview (flavour) of current statistical methods. Many of the topics touched upon in this course will be given a fuller treatment in some the advanced specialised PhD courses.

### GRADING POLICY:

- Midterm: 30% (either before or after Spring Break)
- Final Exam: 50%
- 20% based on class participation and homeworks.
- Homework:
  - Homework is an extremely important part of learning, therefore it will be assigned regularly and must be turned in for grading. You must do all homeworks. The aim of the homework is to ensure you understand the concepts introduced in class. It is there for *your* benefit. For this reason, you may discuss the homework problems with other students, but you should write up your solutions independently. Do not copy other students' solutions or solutions from a solutions manual.
  - Please write articulate solutions. Do not waffle. Use your homeworks as a method for learning how to write a thesis or articles.
- If you have any problems in the course please see me (don't leave it too late).
- If you are unable to take a test when scheduled because of illness, accident nor circumstances beyond your control, notify me by telephone before the exam. A make-up test will be scheduled as soon as possible.

- A grade of incomplete (I) will be given only in the event that circumstances beyond your control were the cause of your missing the exam. This grade will not be given because you felt that you have too much other work or study or because you feel that you will not earn an acceptable grade in the course.

- **STATEMENT ON DISABILITIES:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Office of Support Services for Students with Disabilities in Room 126 of the Koldus Student Services Building. The phone number is 845-1637

- **PLAGARISM STATEMENT:**

The handouts used in this course are copyrighted. By "handouts," I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission. As commonly defined, plagiarism consists of passing off as one's own ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

- **ACADEMIC INTEGRITY STATEMENT:**

**"An Aggie does not lie, cheat, or steal or tolerate those who do."**

See also the Honor Council Rules and Procedures on the web.

<http://www.tamu.edu/aggiehonor>

**Actually all the above is rather tedious to read. It can be summarised as follows, if you have any sense of decency, you would not bother to cheat. Its just not worth it.**

### **Syllabus** (subject to changes)

- The likelihood (Cramer-Rao inequality, sufficient statistics).
- Introduction to the exponential family (we will return to this important family when we do GLM - ie. there is a response variable and explanatory variables which influence the response).
- The maximum likelihood estimator and its sampling properties (how the Taylor expansion can be used to derive asymptotic distribution of an estimator).

- Confidence intervals, the Log-likelihood ratio test, the Profile likelihood and the delta method.
- Non-regular models.
- Misspecification and the Kullback-Leibler criterion.
- Model Selection.
- The central limit theorem for sums of iid random variables and the Bootstrap and Edgeworth expansions (not to be examined).
- Empirical distributions and the nonparametric likelihood (not to be examined).
- Survival Analysis.
- The EM algorithm.
- Estimating functions/Estimating equations.
- Generalised Linear Models.
- Proportions, Counts, Contingency tables and Overdispersion.
- Survival analysis with explanatory variables.
- A quick review of nonparametric regression.